

**CLAIMS**

- 5 1. Continuously variable mechanical transmission that contains two differentials and a variator, characterized in that the input shaft is simultaneously joined to a shaft of each one of the two differentials, the output shaft is simultaneously joined to another shaft of each one of the two differentials and the variator is connected between the shafts not joined to the input or the output of each differential.
- 10 2. Mechanism that allows extending the range of variation of continuously variable and reversible mechanical transmission, characterized in that the input shaft of the mechanism is alternatively connected to the input shaft or to the output shaft of the continuously variable transmission which forms the core and whose range we aim to extend, also characterized in that the output shaft of the
- 15 mechanism is alternatively connected to the output shaft or to the core input, shaft characterized in that when the input shaft is connected to the core input shaft, the output is connected to the core output shaft and when the input shaft is connected to the core output shaft the output shaft is connected to the core input shaft, and characterized in that these connections are performed via any
- 20 of the different multiplicities of gear ratios.
- 25 3. Continuously variable mechanical transmission that contains two differentials, a variator that allows gear ratios to be obtained between 0 and  $\infty$  (i.e. from when the output shaft remains blocked while the input shaft rotates freely until the input shaft is blocked while the output shaft 25 rotates freely) and two sets of multiple gear ratios with a clutch or connection system, each which allows selecting one within each set so that it remains connected, characterized in that the input shaft is joined to one of the shafts of the first differential, the output shaft is joined to one of the shafts of the second differential, any of the
- 30 gear ratios of one of the sets of fixed gear ratios may be connected between the remaining shaft of the first differential and the shaft whereto the variator has been connected to the second differential, and any of the gear ratios of the other set may be connected between the remainder of the second differential and the shaft that has been connected to the variator of the first differential.
- 35 4. Continuously variable mechanical transmission comprised of a

multiplicity of differentials and a variator that allows gear ratios to be obtained between 0 and  $\infty$  ( i.e. from when the output shaft remains blocked whilst the input shaft rotates freely until the input shaft remains blocked while the output rotates freely), characterized in that all the differentials have a shaft joined to the input shaft and another to the output shaft and also characterized in that by means of suitable connections or clutches, any of the shafts not connected to the input or the output of the odd differentials may be connected, via a different gear ratio for each one of them, to one of the variator shafts and any of the shafts not connected to the input or the output of the even differentials may be connected, via a different gear ratio for each one of them, to the other variator shaft.

5. Continuously variable mechanical transmission, characterized in that it extends the range of variation of a mechanism such as that described in claim 1 by a mechanism such as that described in claim 2.

6. Continuously variable mechanical transmission as claimed in claim 1 or 5 characterized in that the speed variator is of the type that may produce continuously variable gear ratios from  $-\infty$  to  $\infty$  passing through zero.

7. Continuously variable mechanical transmission, characterized in that it uses a mechanism such as that described in claim 1 or 3 or 4 or 15 or 16 or 17 or 18, wherein the characteristics of its differentials and of its gear ratios are selected so that it produces a continuously variable gear ratio from zero to a maximum value.

8. Continuously variable mechanical transmission, characterized in that it uses a mechanism such as that described in claim 1 or 3 or 4 or 15 or 16 or 17 or 18, wherein the characteristics of its differentials and of its gear ratios are selected so that it produces a continuously variable gear ratio from a minimum negative value to a maximum positive value passing through zero and reversing the rotation direction.

9. Continuously variable mechanical transmission, as claimed in claim, characterized in that it adds, to the output shaft of the mechanism, another shaft that can either be directly connected to this or connected to it by a set of

gears which reverse the rotation direction.

5 10. Continuously variable mechanical transmission, characterized in that it uses a mechanism such as that described in claim 1 or 2 or 5 or 6 for gear ratios where the output torque is always lower than the maximum permitted torque without need for any limitation (high range) and characterized in that it uses a mechanism such as that described in claim 7 or 8 or 9 for gear ratios where it is necessary to limit the output torque so that the maximum permitted is not exceeded (low range).

10 11. Continuously variable mechanical transmission, as claimed in claim 10, characterized in that the minimum gear ratio of the high range mechanism is equal to the maximum gear ratio of the low range mechanism or alternatively in that in the region of minimum gear ratios of the high range mechanism and the region of maximum gear ratios of the low range mechanism there is overlapping with gear ratios common to both, and characterized in that the transition between the low range and high range is performed by suitable clutch or connection at the time when the gear ratio of both coincide.

20 12. Continuously variable mechanical transmission as claimed in claim 11 or 12 characterized in that the speed variator used in the high range mechanism is the same as that used in the low range mechanism.

25 13. Continuously variable mechanical transmission, as claimed in claims 1 to 12, characterized in that the speed variator consists of two electric machines that can work indiscriminately as a generator or as an engine and controlled by the suitable electronic circuits.

30 14. Continuously variable mechanical transmission, as claimed in claim 13, applicable to machines with heat engines, e.g. motor vehicles, characterized in that it uses the electric machines which comprise the variator such as starting motor and electric generator to charge the battery.

35 15. Continuously variable mechanical transmission, as claimed in claim 3, characterized in that one of the gear ratios is zero, and therefore it is embodied by the possibility of braking or blocking one of the shafts that it connects doing

so joined to the chassis of the mechanism.

5        16.    Continuously variable mechanical transmission alternative to that of claim 3 or 15, characterized in that instead of connecting the speed variator between one of the shafts of a differential and another of the shafts of the other, the variator is connected between the two shafts not connected to the input of the first differential.

10       17.    Continuously variable mechanical transmission alternative to that of claim 3 or 15, characterized in that instead of connecting the speed variator between one of the shafts of a differential and another of the shafts of the other, the variator is connected between the two shafts not connected to the output of the second differential.

15       18.    Continuously variable mechanical transmission, as claimed in claim 4, characterized in that it further has the possibility of directly connecting one of the shafts of the variator to the output shaft via a gear ratio which can be activated or deactivated by means of a clutch or any other type of suitable connection.